In the original band we could pass continuously along the edge from B to A (= D) to C (= B) back to our starting point. Now, in cutting along the line EF we nowhere cross this continuous edge, so that it will remain an edge of the new surface, while the cut will form a second edge of the new surface. We have thus removed one of the distinctive characteristics of the double surface, by having a surface bounded by two lines. Furthermore, it will be impossible to pass in the new band from a point on one side of the paper to the corresponding point on the opposite side without crossing the edge. The reason for this will be more obvious in the following:

In forming the double service we revolved one end of the strip of paper through an angle of 180°, about, say, the point E, or, better, the line EF. It is clear now that if, instead of revolving it through an angle of 180°, we had revolved it through an angle of 2x180°, the point B would have fallen on A and D on C, so that we should have two continuous edges to our surface, and it will no longer be a double surface. We can then say, in general, that if we revolve the end of the strip of paper through an odd multiple of 180°, before fastening the two ends together, we shall always obtain a double surface, whereas if we revolve through an even multiple of 180° we have an ordinary surface. By this means we can distinguish double surfaces from ordinary surfaces.

We will now return to the surface obtained by cutting the double surface along the line EF and see why it must be an ordinary surface. The double surface originally had a twist of 180°. Suppose, now, we have cut it as indicated, but do not let the ends drop apart; then each part on either side of the cut will have a twist of 180°, or, together, 2x180°. If we let the surface fall apart we double the twists again, and our new surface has a twist of 4x180°, and it is therefore an ordinary surface. That this is so may be easily verified by cutting the band across and revolving one end until the strip has no twists, when it will be found that it has to be revolved through 4x180°.

If we cut a double surface obtained by rotating through 3x180° along the line EF, we shall find that we have introduced a knot in our new surface, which in other respects will, however, be an ordinary surface. These knots will be multiplied, as we proceed, to surfaces containing a higher number of twists.

It is easy to see that if we cut an ordinary surface, obtained by revolving the end of our paper through 2x180°, along the line EF, we shall obtain two ordinary surfaces, which are, however, interlinked. The same holds for surfaces with a higher number of twists, where, however, the interlinking becomes more complicated.

Another interesting set of results may be obtained by cutting the surfaces along a line parallel to the edge at a distance from the edge less than one-half the width of the strip of paper. The results will be different in the case of double and ordinary surfaces.

BOTANICAL NOTES FROM WESTERN PENNSYLVANIA.

BY HUBERT LYMAN CLARK, PITTSBURGH, PA.

ON looking over my field notes for the spring and summer of 1893, I find there are a few facts the preservation of which may be worth while, in the hope that before long some competent botanist will prepare an annotated list of the plants of western Pennsylvania. There is not at present, so far as I know, any such list, and its appearance would be welcomed by all our local botanists. Whenever the work is undertaken it will be desirable to have as much material in available form as possible, and so I have presumed to publish my important notes in *Science*, hoping they will also prove of interest to botanists elsewhere.

On analyzing specimens of *Delphinium* from the country around Pittsburgh last spring, I was struck with the rich coloring of the flowers. There was not the least doubt about the plant being *D. tricome*, but, to my surprise, Gray's "Manual" says the flowers of *D. tricome* are "bright-blue, sometimes white," while every specimen which I examined had "royal purple" flowers. Thinking that the trouble might be in my sense of color, I looked through the "Manual" for other "bright-blue" flowers. I found *Aster undulatus*, *Chicorium intybus* and *Campanula rotundifolia* so given, and I should certainly call them so, but the *Delphinium* of this vicinity has flowers of the same color as *Liatris scariosa*, which Gray calls "rose-purple," or perhaps nearer to *Aster novæ-angliæ*, which is given as "violet-purple." Never having seen *Delphinium* growing elsewhere, I am curious to know if in other parts of its range it really does bear flowers similar in color to *Chic.rium* or *Campanula*, or whether it is not a slip of the pen in the "Manual" to describe them as "bright-blue." In the same work (which is perfectly invaluable to an amateur botanist in the east) *Silene nivea* is recorded as "rare," and it is with great pleasure, therefore, that I can report it as abundant in several places around Pittsburgh. Indeed, I am inclined to think it is the most common representative of its genus in this neighborhood.

None of the botanists whom I have consulted record *Trifolium stoloniferum* east of Ohio, and it is therefore very pleasant to be able to record it from Pittsburgh. On the 8th of last June I found it growing in an open space in some woods about six miles east of the city. While it is of course possible that it has been introduced, it was growing so far from any house or highway as to certainly appear indigenous. There is no specimen of this clover in the herbarium of the Western Pennsylvania Botanical Society, and I am inclined to think this is the first record for the State.

Gnaphalium purpureum is reported in the "Manual" to occur in "sandy or gravelly soil, coast of Maine to Virginia and southward." It is not very clear from this how far inland we may expect to find it, but certainly the implication is that it is a seashore plant It may be worth while, therefore, to record that it is not very rare around Pittsburgh, three hundred and fifty miles from the coast! I found it growing in Arlington, twelve miles south of the city, in June last, and there are a number of specimens in the herbarium of the botanical society to which reference has been made. These specimens are from widely-scattered points in the county, and would seem to indicate regular and not uncommon occurrence. One of the most abundant weeds in many parts of Pittsburgh is a species of *Galinsoga*, differing from *G. parviflora* in the scales of the pappus and being very hairy instead of smoothish. Dr. Robinson, of the Gray Herbarium, Cambridge, to whom I am indebted for many favors, kindly identified the specimens sent to him as "a possible variety of *G. hispida*," or at least so it may be considered provisionally. Similar specimens are reported from Milwaukee and Providence. Whether *G. parviflora* occurs in Pittsburgh I cannot say, but I have not yet found any specimens agreeing with the description in the "Manual." Another plant which Dr. Robinson identified for me is also an introduced species reported in the "Manual" as "rather rare; in cultivated grounds." I refer to *Veronica arvensis*, two specimens of which I sent to Cambridge, supposing them to represent different species, they were so unlike. One of them was collected in open pasture land, and I found similar specimens in

other places of a like nature. It appears like an introduced species, and I suspected it was *V. arvensis*. So far as I know, it has not been previously recorded here, and there is no specimen in the herbarium of the botanical society. The other specimen also referred to *V arvensis* was collected in the Allegheny Mountains near Altoona, and differed from the first in the size, shape and abundance of the leaves. It was growing on a hillside in the woods, far from any house or road and at some distance from cultivated ground, so that it appeared to be indigenous.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

FEIGNED DEATH IN SNAKES.

IT was I who suggested to Professor Kilpatrick the possibility of the apparent biting of itself by *Heterodon* being in mimicry of that which was claimed for the rattlesnake. But I do not at all *know* that the rattlesnake *has* any such habit. I have often heard it from the herdsmen on our prairies in an early day concerning our short Massassaugas, *Caudisona tergemina* (Cope). I have repeatedly heard persons say that they had taken a small switch and teased a rattlesnake till, in its anger, it would bite itself and die. But after reading Dr. Mitchell's statement that he had often injected the snake's own poison into its circulation without any apparent effect, I grew skeptical on the suicide theory. Professor Kilpatrick's narration to me recalled the traditions, and, knowing that this spread-head often mimicked the ways of poisonous kinds, it occurred to me this might be another manifestation. Cannot someone inform us whether it be true that any of the Crotalidæ have, or pretend to have, this suicidal habit, and can we not have some further statements from herpologists as to whether in any serpent its poison is fatal to itself or its fellows? Analogy would indicate that it might be. Bee stings are fatal to each other, and it seems well established that scorpions commit suicide by their own stings under certain circumstances of torment.

Apropos of the conduct of Professor Kilpatrick's snakes being a "*faint*, instead of a *feint*," it is perhaps well known that Dr. C. C. Abbott, in "Rambles About Home," claims that the similar conduct of the opossum is really a spasm from fear (rendering the creature unconscious), instead of a shamming of death.

J. N. BASKETT.

Mexico, Mo.

A PECULIAR FLORA IN CHICAGO.

WHILE in Chicago last July I spent some little time in botanizing in the vicinity of the Fair grounds, and I was much struck with the peculiar flora of two vacant lots in that neighborhood. One of these is at the corner of Oglesby avenue and Sixty-second street, and is very dry with the grass cropped short by grazing animals. Here I was surprised to find the ground covered with *Potentilla anserina*, which I have never found previously in any but very marshy places. Indeed, until I had analyzed it, I could scarcely believe that it was not some other species. The plants were all very dwarfed, presumably from their unfavorable environment, but otherwise agreed perfectly with *P. anserina* from other localities. On the edge of this same lot was a thriving specimen of *Habenaria leucophaea*, also a plant of the marshes, and so out of place here. I am inclined to think, therefore, that before the extension of the city so far south these lots were marshes and the plants are but survivors of the former flora.

In the other lot, however, at the corner of Woodlawn avenue and Fifty-ninth street, the peculiar flora does not admit of as easy an explanation. In this field the soil was rich and moist (though nowhere wet) and covered with a good growth of grass and sedges. Here I found several specimens of *Galium boreale;* and *Calamintha nuttallii* was abundant. The former, according to Gray, is an inhabitant of the "rocky banks of streams," while the latter occurs only on "wet limestone river banks." So unlikely a place did it seem for *Calamintha* that I sent a specimen to the Gray Herbarium at Cambridge, but Mr. Fernald, who very kindly examined the plant, assures me that my identification was correct. He suggests also that the species may have been introduced in that place, but I must say that this seems improbable to me. Perhaps some one more familiar with the botany of Cook County may be able to explain the occurrence of these two species in such an unlooked-for locality.

HUBERT LYMAN CLARK.

Pittsburgh, Pa.

ESKIMO TRACES IN NEW YORK.

SIR DANIEL WILSON once suggested a connection between the Eskimo and the Iroquois, founded on physical structure. The habits of the two were so different, however, that this is probable only in a slight degree. That the Eskimo once roamed where the Iroquois afterwards lived seems certain. If the Northmen reached the shores of New England, the Eskimo must even then have dwelt along the coast, and archæology makes it probable that a large part of the Middle States had not then been occupied by the so-called Indian tribes.

The recent collections made far north have been especially interesting to me as bearing upon some relics found in New York and Canada, and in a less degree in New England. The one-sided harpoon of Alaska differs in no respect from those which the Mohawks and Onondagas used three hundred years ago. The half-circular slate knives found all through the territory mentioned are like those of the Eskimo women now. The Ninth Report of the Bureau of Ethnology contains other suggestive material. Through central New York, in portions of the Province of Ontario, in Canada, and along Lake Champlain occur double-edged polished slate knives, arrow-like in form, almost identical with those on page 151 of the report and some following pages. Rarely have I seen them single-edged, and, as they usually occur near streams, I have thought they were used in opening and cleaning fish. Almost all those I have seen in New York and Canada have slight barbs, a feature which seems lacking in the Eskimo knife. With us they are made of various kinds of slate, and I have one very broad form of red slate. Usually they are dark grey. The flat tong is always bevelled, and often notched. A very delicate and beautiful one I recently figured from the Oneida River.

If the Iroquois used combs at all before European contact, they were very simple, but some of their later examples remind one of those of the Eskimo under similar circumstances. The wooden and horn spoons are also suggestive, the broad wooden spoon occurring